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A PROPOSED METHOD OF APPROACHING NEW YORK HARBOR BY SOUNDING.

By Lieutenant Trudelle, of the French Navy, Commanding the Transatlantic Company's Steamer "France."

[Translated and arranged for the American Geographical Society by Lieutenant Theodorus B. M. Mason, U. S Navy.]

Although generally conceded that summer is the foggy season on the American coast, it is during the winter months, from December to March, that the most fog is found on the Long Island and New Jersey shores. It is during these months that most of the cases of going ashore occur.

Without considering whether the current which *generally* exists between the American coast and the Gulf Stream is a counter current of the Gulf Stream or the continuation of the Labrador current, it will be sufficient to state that it sets to the southward and westward, and that it is not uncommon to find it from the Nantucket Banks to the mouth of the Delaware moving at a rate of two miles an hour; its temperature is much lower than that of the Gulf Stream. From the Nantucket Banks to New York it augments in force with and after on-shore winds. Because this current is *generally* to the southward and westward, it must not be supposed that it is always so. Sometimes there is no current. At others it has been found setting to the northward, and northward and eastward; this is, however, of rare occurrence; in this case it is very feeble.

A fresh-water current flows out of the Bay of Fundy at the season of the melting of the snow and ice (April and May). This currrent, flowing to the southwest and to the south southwest, joins, after crossing St. George's Bank, the one previously alluded to.

It would seem probable that the grounding of transatlantic steamers, which has occurred so frequently on the New Jersey coast from Squan Beach to Sandy Hook, might be attributed to this southwesterly current, and the peculiarities of soundings on the routes generally taken, which blind the navigator to the effects or the current. Before going further, let us examine the facts which have come to our notice in a period of three years (1874–1877), groundings, wrecks, and observations.

1st. The *Alexandre Lavallée* (French steamer), lost on Long Island, near Shinnecock light. It would be interesting to know how the vessel came to this position, but no details are at hand.

2d. The *Queen* (English steamer) went ashore on Squan Beach in a fog ; fine weather, calm ; floated off with the aid of a N. W. squall twelve or fifteen hours afterwards ; reached New York without serious loss. What precautions were taken on approaching the land, in this case, are not known, but as the fog had existed for two days previous to the accident, it is not probable that she approached without sounding. At any rate, she overran her reckoning and was to the southward.

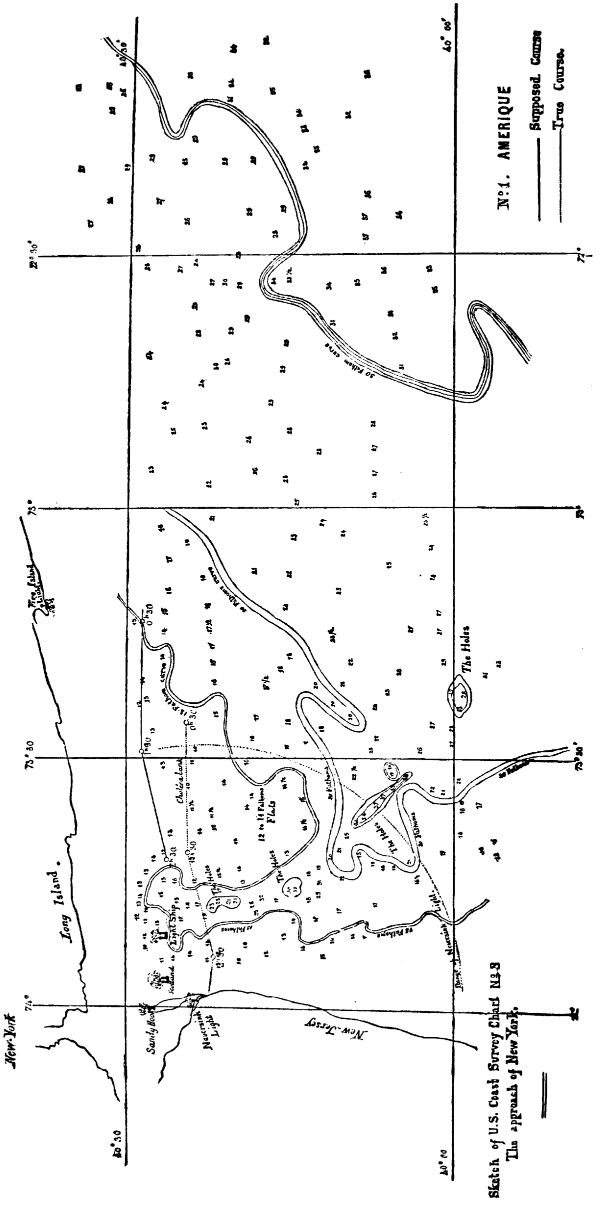
3d. The *Vicksburg* (American steamer). The *Vicksburg*, coming from the southward, was lost on Long Island the same day as the *Queen*, she having, in a clear-up, mistaken Fire Island light for Barnegat light ; last sounding, 12 fathoms ; bottom, fine sand.

4th. The *Circassian* (English steamer), lost on Long Island. No details at hand.

5th. The *Amerique* (French steamer). On the 7th of January, 1877, in thick weather and an easterly gale, the *Amerique* went ashore at Sea Bright. Good observations on the 6th, at meridian. The weather became thick about midnight ; soundings were taken at 12h. 30m., 1h. 30m. A. M. and 2h. 30m. A. M. At the instant of soundings, 2h. 50m. A. M., the reckoning placed the ship 10 miles to the E. N. E. of Sea Bright ; ahead of her reckoning and to the southward. (Plate No. 1.)

6th. *Russland* (Belgian steamer), some days after the *Amerique* in thick weather, went ashore some miles to the southward of the preceding. Less solidly built, but especially less fortunate, the *Russland* went on a hard bottom (an old wreck), which soon broke her in and sunk her. All that we know of the *Russland* case is, that the captain took early precautions, having in mind the recent going ashore of the *Amerique ;* he intended to bring to 20 miles from the shore. He was, therefore, more than 20 miles ahead of his reckoning, and to the southward.

7th. During the stay of the *Amerique* on the sands (from January 7th to April 10th, 1877), two steamers owed their salvation to



Sketch of U.S. Coast Survey Chart No 3
The approach of New York.

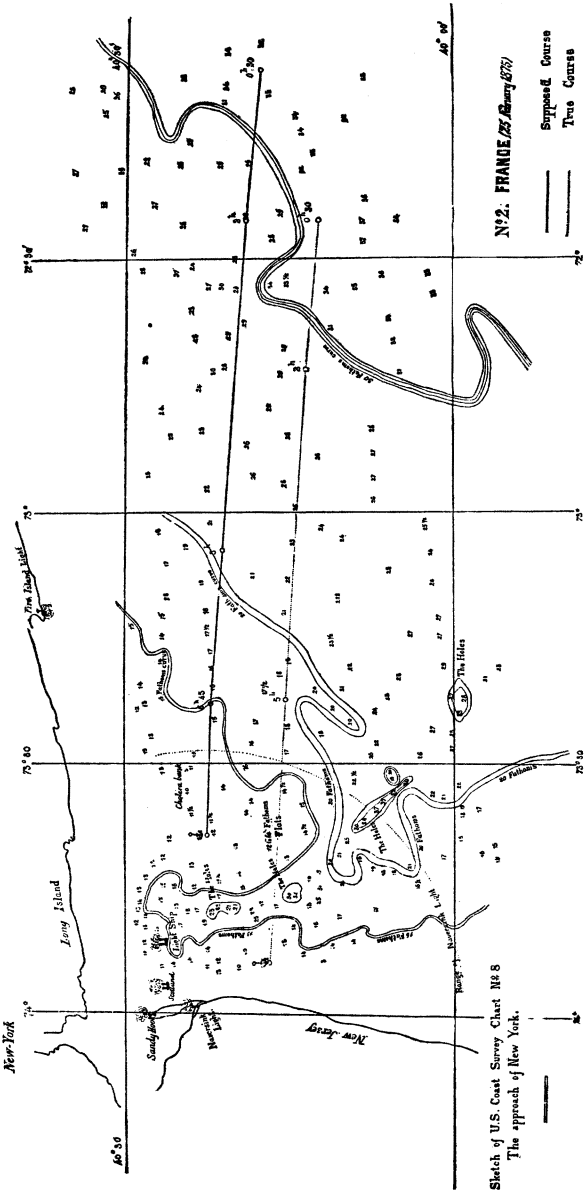
her presence at Sea Bright. This large object, which they noticed in time, caused them to go about some minutes, or perhaps even seconds, before the moment when they would have touched. These vessels were ahead of their reckoning, and to the southward.

8th. The *France* (French steamer), lost on the 25th February, 1875, in thick weather. She anchored in 12 fathoms of water, 14 miles to the W. S. W. of her estimated position, which placed her in the same depth of water 11 miles E. S. E. of the Sandy Hook lightship. Ahead of her reckoning, and to the southward. (Plate No. 2.)

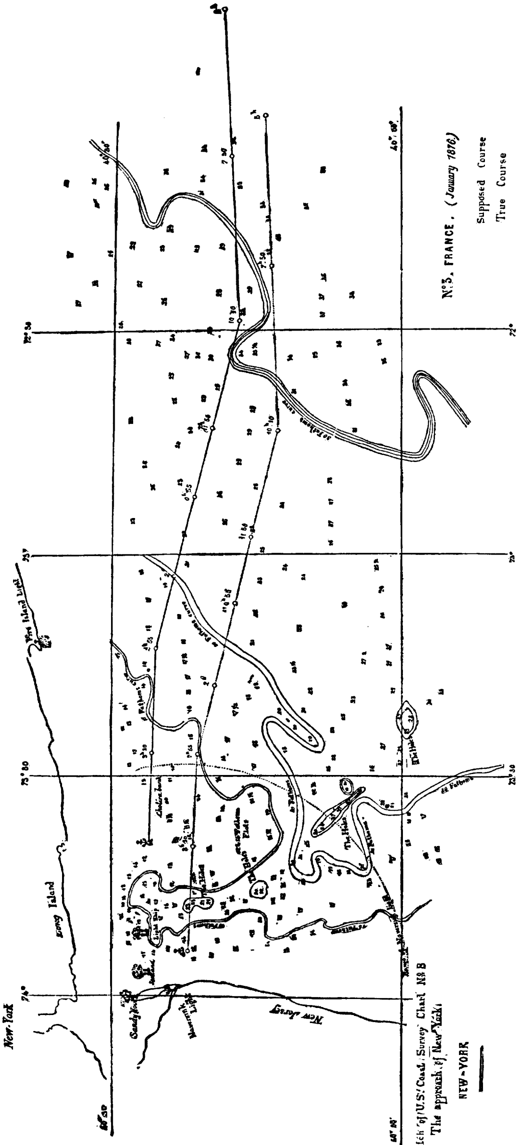
9th. The *France* (same ship). January 1st, 1876, running by soundings in thick weather, the *France* anchored in 12 fathoms, 12 miles to the W. S. W. of her estimated position, which should have placed her in the same depth of water 9½ miles to the eastward of the Sandy Hook lightship. Ahead of her reckoning, and to the southward. (Plate No 3.)

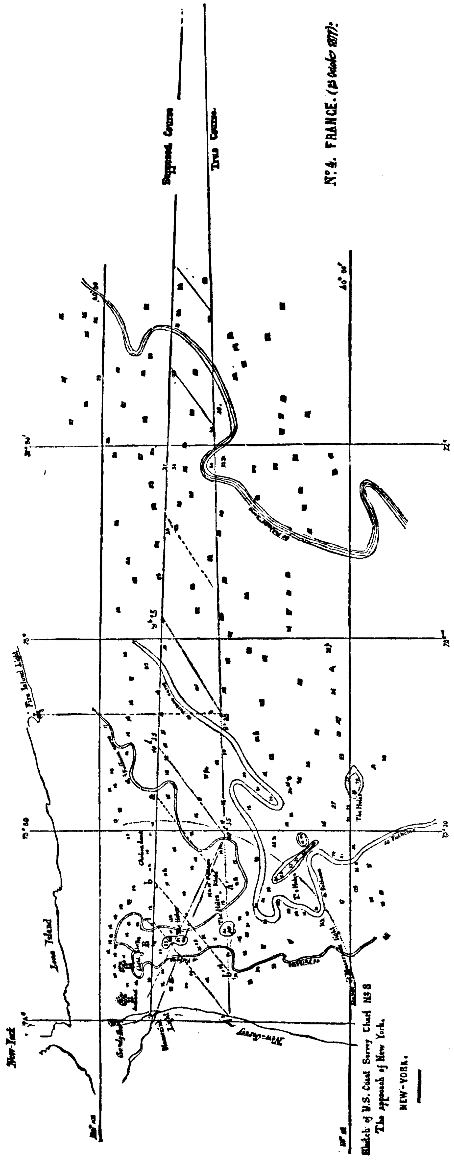
10th. The *France* (same ship). October 25th, 1877, at meridian, excellent observations placed the ship 154 miles from Sandy Hook. Fine weather; almost calm. Magnetic course N. 87° W. to Neversink light; passed 15 miles to southward of Fire Island tower. At 9h. 35m. P. M. Fire Island light, bearing magnetic north, showing an overrun of 8½ miles on the reckoning from noon. It also appeared further off than 15 miles, the distance at which it should have been passed. At 10.35, the Neversink lights appeared to starboard, bearing N. 65° W. (true), giving by their bearings at position 9 miles to the southward of the estimated one. The course N. 87° W., giving actually one S. 87° W., passing 11 miles to the southward of the Neversink. Nine miles to the southward and 8½ miles to the westward in 10h. 30m. is 12½ miles to the southward and westward, or 1m. 25 per hour. From 10h. 35m. P. M. to midnight, the vessel going 13 knots, it was necessary to head gradually 6° to the starboard to counteract the current and keep her heading on the Neversink lights. (Plate No. 4.)

These examples show sufficiently well the influence of the southwesterly current on the courses, and it remains to be seen how careful and prudent captains did not know, by means of sounding, their true positions. By comparing the accompanying charts, which refer to the *Amerique* and *France*, with U. S. Coast Survey Chart No. 8



Sketch of U.S. Coast Survey Chart No 8
The approach of New York.


N°.3. FRANCE. (January 1876)
Supposed Course
True Course
Sketch of U.S. Coast Survey Chart No. B
The approach of New York
NEW-YORK
New-York
Long Island
Fire Island Light
Sandy Hook
Navesink Lights
New Jersey
40° 00'
40° 30'
74°
73° 30
73°
72° 30
72°



Sketch of U.S. Coast Survey Chart N° 8
The approach of New York.

NEW-YORK.

(Gayhead to Henlopen), it is immediately apparent that, on the actual courses and the intended courses, the soundings are almost exactly the same. Nothing further is needed to explain all the mistakes, and demonstrate clearly that the route is dangerous, as the same successive arrangement of soundings may occupy many different positions on the chart.

Then, taking plate 4, referring to the *France* (observations of Oct. 25th, 1877), it is seen that it is easy to find, in the different positions, true and estimated depths exactly similar on the two courses, separated by the same distances, with the final difference of 10 miles to the southwestward in the positions at 10h. 35m. P. M.

Let us suppose a vessel arriving on this course, having had good observations at meridian, finds weather thick at 4 P. M., or 100 miles from Sandy Hook. Let it be admitted that soundings were commenced in about 25 fathoms of water; the soundings agreeing perfectly with those estimated on this course, would certainly have given the captain confidence in regard to the 10h. 35m. P. M. position. Continuing his course, without sounding, with the intention of bringing to, or anchoring, according to the weather, at *A* or *B*, the ship would simply go ashore at *A*.

It is most probable that this has already happened to more than one vessel, and it is, moreover, in this way that the *France* obtained erroneous positions on February 25th, 1875, and January 1st, 1876. The soundings, although very numerous, agreed so exactly with what it was estimated that they should have been, that the position seemed certain. But let us return to our supposition :

We have a vessel ashore after running by reckoning only 15 or 16 hours, and with excellent soundings. Let us blame the captain for not having continued his sounding after 10h. 35m. P. M., and let us notice that two soundings, taken unfortunately at a^1 and b^1, would only have increased his certainty of having good positions at a and b. A sounding at c^1 would perhaps have enlightened him, but it is more than probable that it would only have surprised him. Admitting that this sounding would have saved the vessel by stopping her, it would have been by chance ; in navigation nothing must be left to chance that can be helped ; chance has already too great a hold on the fate of vessels.

It can be assumed that running in on a westerly course offers no assurance of safety.

The lines of equal depths in the latitude of Sandy Hook, run almost parallel to the Long Island coast ; that is to say, W. S. W. and E. N. E. ; it is self-apparent that a westerly error accompanied by a southerly one would not be made evident by sounding, and that it is easy to trace, to the southward of each other, westerly courses on which the soundings will coincide with the course actually run, but with marked differences toward the west, that is, toward the dangerous Jersey shore, more marked still as these lines or courses are more and more to the southward.

It is about on the parallel of 40° 25′ that vessels generally run in arriving. Five or six miles' difference towards the south give from ten to twelve miles' difference westward for the same depth of water. Besides, the depths of 13 and 14 fathoms, and even of 10 and 12 fathoms (Cholera Banks), are met on this course at 25 or 30 miles from Sandy Hook, but they are also found at 2 or 3 miles from the coast. How can we clearly distinguish them one from the other? By the quality of the bottom? In most cases this is a poor means, and most uncertain. I have heard many seamen propose the following method: When, by reckoning, you are in the environs of Fire Island, steer to the N. W. until you get 15 fathoms by the lead ; then run W. S. W. toward Sandy Hook, and stop when *you think* that you are at the proper distance in 13 fathoms of water.

This routine method is as uncertain as the direct course, and condemns itself. At sea there is no such thing as "*you think*" when one can be absolutely certain. All the vessels that went ashore were *thought* to be in good positions.

The only conclusive way of assuming the safety of one's ship on this course is to stop when you reach 14 fathoms, but one is exposed to "hinging to" very far off, and, above all, one does not know where he is.

The quality of the bottom should not be neglected, but I consider it only useful in selecting good holding ground. The *Vicksburg*, for instance, having a sounding in 12 fathoms, *fine sand, no gravel*, should perhaps have thought that she was not off New Jersey, For the *Amerique*, on the contrary, the presence of pebbles in the arming of the lead at her 13-fathom sounding, 2 h. 30 m. A. M., indicated very clearly that she was off New Jersey, and that it was necessary to go about promptly. The unpardonable ignorance of the pilot, who affirmed that these pebbles were not found on the

Cholera Banks, was certainly one of the principal causes of the going *ashore*.

I have shown the danger, or at least the uncertainty, of soundings on a direct course—uncertainty caused by the lay of the bottom. As we cannot change this, we must modify the course, bending it to the requirements of the bottom, if we wish to find in sounding a means of determining exactly the position of the ship, whatever may be the error attributable to previous navigation during the voyage, or due to the prevailing current on approaching the coast.

I will *enact* a position assured to within two or three miles. To ask more in thick weather, except in localities particularly arranged, would not be reasonable. It is sufficient if the error is not dangerous.

Let us trace very carefully and distinctly upon the U. S. Coast Survey, Chart No. 8 (Gayhead to Henlopen), the 15-fathom, 20-fathom and 30-fathom curves. Let us suppose a vessel, which is estimated to be at a distance of 150 miles from Sandy Hook, in latitude 40° 25′ N. Let us allow her an error of 15 minutes to the northward or southward, and in her longitude whatever easterly or westerly error we choose. This vessel is heading magnetic west· (Plate No. 5.)

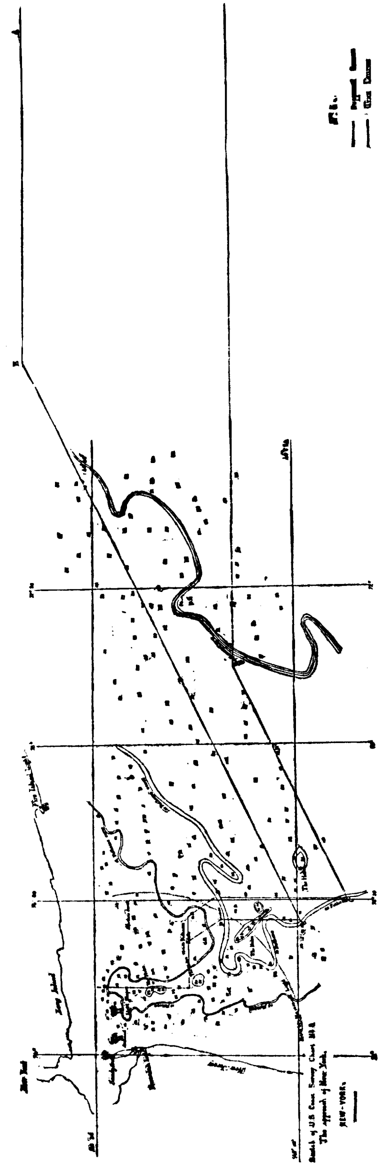
The indefinite geometrical space of her position will be limited to the northward by 40° 40′, and to the southward by 40° 10′. Let us allow this vessel to run to the westward until she reaches a depth of 28 or 30 fathoms, and then to head magnetic S. 65° W. ; the soundings will diminish progressively and she will arrive on the 20-fathom line.

During the run S. 65° W., the geometrical space of the ship will be B C B′ C′ ; when she shall have arrived at 20 fathoms this geometrical space will have become C C′, a simple line.

At this time the latitude will be between 40° and 39° 52′, and the longitude between 75° 49′ and 75° 54′ (from Paris), whatever may have been the primary errors in these two elements.

By the simple changing of course at the first sounding of 28 or 30 fathoms, and the knowledge of the line of 20 fathoms, the large indefinite surface A B A′ B′ will have become a line of little width, and the error in longitude will not exceed 6′ or 7′.

Steering magnetic northward after finding C C′, the ship will find the soundings increasing until she finds a second time the 20-


Sketch of U.S. Coast Survey Chart No. A
The approach of New York.
NEW-YORK.
Fire Island Light
Long Island

fathom curve on its other branch in D D′. But the route pursued to the northward, inscribed in the new geometrical space C D C′ D′, will show the positions of the two 20-fathom soundings—one will be on C C′, the other on D D′. The latitude of the last will certainly be 40° 11′ or 40° 12′, a difference of only 1 minute, and the longitude will be determined to within 1′ or 2′. The error produced by the current on the short run to the northward will be inconsiderable.

From D D′ the route can be continued in all security to the lightship. Let us notice that:

1. In the vicinity of D D′ the 15-fathom curve is very near the 20-fathom one, and surrounds a plateau, included within the range of the Neversink lights, on which we find from 11 to 12 and 14 fathoms of water.

2. This same 15-fathom curve surrounds a depression which extends to the lightship, and in which, in greater depths than 15 fathoms, "the holes" are to be found.

We must get into this depression, which runs almost north and south. Leaving D D′ on a cruise N. 35° W. (true) and running 6 or 7 miles, we find ourselves on the flats in less than 15 fathoms of water. If it is blowing heavily this is a good place to wait for a lift in the weather, being certainly within range of the lights.

If, notwithstanding the fog, the weather is fine, we may continue on towards the lightship, running magnetic west, taking the precaution to sound frequently in order not to overrun the depression.

At the first good sounding of more than 15 fathoms (from 16 to 32 fathoms, perhaps), steer magnetic north., On this course the lead will give over 15 fathoms until very near the lightship.

As soon as the soundings are in 13 or 14 fathoms of water we can anchor with the certainty that we are in the vicinity of the lightship, ready to cross the bar as soon as it clears off.

A B A′ B′, looking for bottom in 28 or 30 fathoms, the reckoning placing us in those depths, the lead continues to give more water; we can conclude then we are very much to the southward (perhaps to the southward of 40° 10′). We must then steer magnetic W. N. W. until the soundings are as required. We will then enter the space B C B′ C′. Then steer S. 65° W.

On the northerly course, in C D C′ D′, we will perhaps cross the little depression of 19 and 20 fathoms, which is near the 37-

fathom hole. If we should happen to sound in it we could not mistake it for D D′, as the depths increase after crossing it. This sound would act more as a guide than as a drawback.

1. I have not spoken of the mudholes which may be found when sounding; these holes are an excellent guide, and when one of them is found we must profit by it; but to look for them would be a long and delicate operation; whereas we are always sure of finding a line normal to the one which we are steering. The trick is not to overrun it, and this only requires proper attention.

2. The first 20-fathom sounding which is reached on C C′ is more than 20 miles from the shore; we can, therefore, run for it without danger, however great may be the error of our reckoning.

3. The nearest course to the land (that which runs to the northward in the depression) is exempt from danger, as it is parallel to the shore, and when it is reached the position is sufficiently assured.

4. I have twice run in by this method—May 8th, 1877, and March 14th, 1878. On May 8th, left at 8 P. M. a position by reckoning 17 miles out. Soundings placed me at 11 P. M. in 3 hours 2 miles only from the position given by excellent cross-bearings. On May 14th, arriving on soundings without observations for the past two days, I ran by soundings alone to within three quarters of a mile of the lightship. In these two experiments I chanced to get a sounding in the 37-fathom hole situated between C C′ and D D′.

In all which precedes, we have supposed that the vessel arriving found thick weather out at sea, but it often happens that the fog occurs only some hours or even some minutes before the time at which we expect to make land or Fire Island light, that is to say, when we are within the 30-fathom curve.

This is, in my opinion, the most unfavorable case, as we have not prepared our base of sounding.

Under these circumstances, as in others, the only way of guaranteeing oneself with certainty is to run for 20 fathoms on C C′ *however disagreeable* it may be not to continue our course when so near our object.

We suppose the ship in latitude 40° 25′ by reckoning, according her the same error of 15′ in one direction or the other. We will cite two cases:

1. At the time that the fog occurs, in over 20 fathoms of water, by sounding (between 21 and 27, for example).

Continue the course west until we reach 20 fathoms (E. N. E. branch of the 20-fathom curve), then steer true south for 10 miles, and thus re-enter the space B C B′ C′, then steer S. 65° W. in order to find C C′.

2. When the fog occurs the sounding is less than 20 fathoms. Steer south (true) until we cross the E. N. E. branch of the 20-fathom curve. From that sounding continue 10 miles to the southward, then steer S. 65° W., as before, to find C C′.

As the figures denoting the soundings on the American charts are in English fathoms, we have adopted that measure in the preceding article.